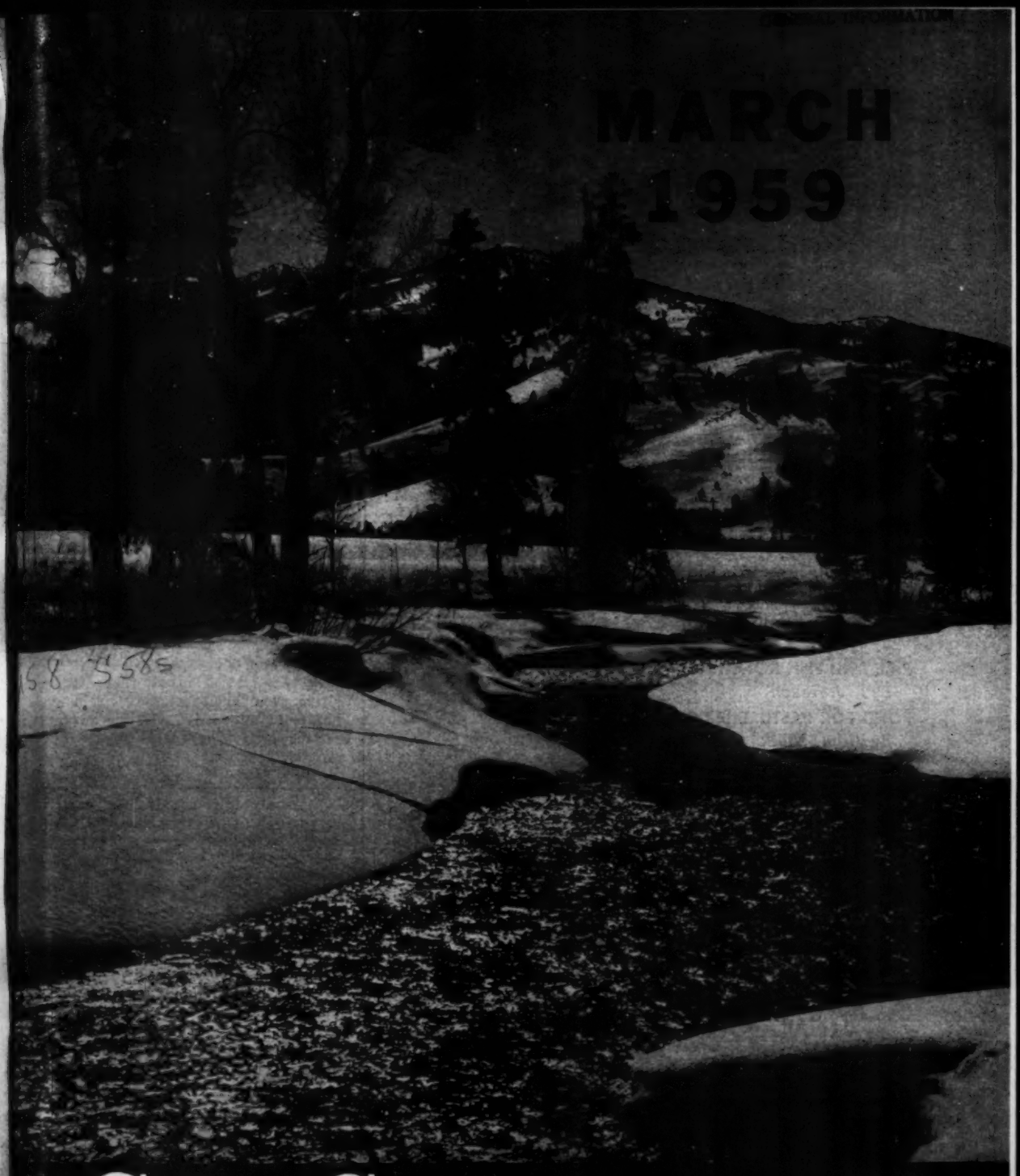

SOIL CONSERVATION

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U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

TOM DALE, Editor

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STRIP SEEDING OF PASTURES.—Marvin Kyle, Buncombe County, N. C., farmer, has found the answer to the problem of soil erosion at pasture seeding time. He lays out the field in contour strips and seeds only the alternate strips.

Kyle had noticed that when entire fields were seeded to grass, heavy rains often washed the topsoil away before the sod could get sufficiently established to prevent soil loss.

He brought his problems to SCS technicians who assist the Buncombe County Soil Conservation District. They suggested the alternate strip seeding plan and helped him lay out the strips on the contour.

Kyle is well pleased with results. "I have found," he says, "that when pastures are seeded in alternate contour strips, even runoff from heavy rains cannot build up enough velocity to cause serious erosion."

Editors are invited to reprint material originating in this magazine.

FRONT COVER.—The spring thaw begins on the mountains of central Idaho.
Photo by Robert B. Branstead

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For Better Times Ahead

Farmers and Businessmen in Parts of Four Counties of Western Kentucky Organize a Conservancy District to Help Restore a 325-Square Mile Watershed to Its Former Productivity.

By KENT ALVERSON

TAKE to the hills, men! Obion's on the rampage again!

For many years, these have been the watchwords up and down the 50-mile length of Obion Creek in western Kentucky. Now, at last, farmers of the area can look forward to the prospect of moving off their erosive slopes back to the safer farming of productive bottomland.

A multimillion dollar watershed protection project, designed to control silting and flooding problems in a 325-square mile area has been approved. This means that more technical help can be provided to speed up the job of getting conservation practices established and structural measures designed. Watershed leaders hope that contracts can be let and dirt moving started by the summer of 1959.

"One of the best things that has ever hit this part of the country!" That's the way Benny Berryhill, secretary of the Obion Watershed Conservancy District, describes the new watershed program.

And that's also the overwhelming opinion of farmers and townspeople. To those who have gambled with the rising waters of Obion Creek to eke out an uncertain living from uncertain crops, it will be the dream of a lifetime come true. To all who live and work in the area it will mean a higher standard of living through more dependable incomes. (At least 75 percent of the farmers resort to outside work to supplement their incomes.) Best of all, it will bring relief and protection to thousands of acres of rolling land not suited for intensive farming.

Obion watershed is a 206,000-acre farming community dissected by Obion Creek and its tributaries. It includes nearly 2,000 farms and 7 small towns in parts of 4 counties. As the crow flies, the watershed is 35 miles long and 10 to 12 miles wide. But, winding Obion Creek traces a semicircular path of about 50 miles from its origin in Graves County near Mayfield to its junction with the Mississippi River near Hickman.

Farms and roads take the brunt of the damage now being suffered. Flooding, silting, erosion, lowered crop yields, and abandoned farms are the main problems. Planning technicians put annual damage from flooding at $52,000 with an even greater damage of $95,000 resulting from deposits of silt in roads, bridge channels, crop fields, and drainage outlets. Erosion damages are much higher. They expect the watershed program to eliminate more than three-fourths of silt and flood damages and

The Obion Creek Watershed Conservancy District posts its boundaries along the main highways.

Note:—The author is information specialist, Soil Conservation Service, Milwaukee, Wis.

give an overall benefit ratio of better than 2 dollars for every dollar spent.

Soils around the Obion are windblown in origin and subject to washing at the slightest excuse. Even with protection, sloping upland soils almost "melt away" when farmed. Past cropping with corn, tobacco, soybeans, and hay has taken a heavy toll in sheet and gully erosion. The trend to conservation farming in the past few years has improved the use and care of the land and brought a decrease in erosion. But, as one farmer pointed out, "We can't put back what's already lost."

In the heart of the watershed lies Murphy's Pond, a swampy wasteland of nearly 1,000 acres and the "catchall" for huge quantities of soil and debris. Each year it has spread out over a little larger area as its outlet to the nearby Mississippi River has been further plugged with tons of silt from valley farms.

Benny Berryhill's farm is 2 miles south of Arlington in the lower part of the watershed. It shares typical problems of this area. Nearly half of his 350 acres is flooded from one to five times each year with conditions growing steadily worse.

"At one time we were able to grow from 75- to 80-bushel corn," Benny relates. "Now we get only about 30 because we have to use early maturing, less productive varieties, and we have to plant so late. In fact, we have almost quit cropping and turned the land back to pasture.

"Taxes have gone down from $251 to $158 for my farm in the past 10 years, but I'd be happy to pay higher taxes if I could get the production back."

Silting has been prodigious. Said Benny, "There are places in my bottom field that have silted to a depth of 5 feet. There's a hay rake sitting in one corner with only 6 inches of the top of the wheels still in sight. All that silt had to come from somebody's fields."

Similar examples can be found in all parts of the watershed. Warren C. Holt, conservationist for the Soil Conservation Service at Mayfield, has a farm west of Milburn that has been in the family for 60 years.

"My father used to ship corn by the carload out of our bottomland," he said. "It's totally unsafe for any crop now. We have had to go to the hills. And it's almost impossible to keep hill ground from washing, even with good con-

A critical silt producing area on the Dunning farm in the Obion Creek watershed.

servation measures, it will run—slough off—scoot down the hill. It develops big gullies even without any drainage area."

Holt said he attempted to seed his bottomland to fescue and clover, but results were discouraging. The clover was eliminated right away, and now 60 of the 75 acres of fescue have been killed out and taken over by swamp grass.

"The last time I worked the bottoms I had three tractors so badly mired down that I had to get a winch to pull them out. It is nothing unusual to see corn pickers left out there all winter.

"Even the hunting is poor," he added. "People used to spend a lot of time hunting rabbits along Obion Creek. I haven't been able to find a swamp rabbit in the last 3 years. The same with birds—I used to hunt quail. There is no range in the bottom now at all."

The Obion Creek community has a long history of flooding troubles. Between Berryhill's farm and a filling station he operates on the edge of Arlington there was once a complete village called Grafton. The struggle against water problems and low incomes drove the people out. The last house was torn down 10 years ago and it has been 20 years since there was much activity. Scrub timber, broomsedge, and briars have taken over.

There is a long history of "solutions", too. According to Ode Mullins, landowner and supervisor of the Hickman County Soil Conservation District, a ditch was constructed as early as 1912 to relieve the flooding problem. Other attempts have been made since then. But, without proper outlet, all floodways have been stopped up with silt, sand, and brush in a few years.

Mullins, an old-timer in the region, pointed out that as the bottom got worse, people had to go to the hills. This doubled the problem because harder farming of the slopes increased the washing and caused more silting and flooding in the bottoms. As a result, he said, many farms have been completely abandoned.

Will farmers give their hill land "a break" with a watershed program? "Yes," says Mullins. "Up and down Obion Creek farms run about half bottoms and half upland. When a man has both types, he is in a position to take better care of his higher ground."

Kudzu on the bank of a road cut in the Obion Creek watershed.

Clayton Nunley, present chairman of the conservancy district, has this to say, "Our hill land is under good land use, but the total watershed and flood protection program would let us move off these hills and go back to the more productive bottomland. The water problems in the bottoms are too tough to deal with individually; as a community, we can lick them."

Both Nunley and Mullins were enthusiastic about the recreational values from artificial lakes to be created as a byproduct of the planned floodwater retarding structures. As Ode says, "Folks are going to fish as long as there's folks. Some fish for pleasure and some to get a mess of fish."

Conservancy district leaders are happy with progress so far and the cooperation they have had with the Army Engineers, whose representatives have attended most of their meetings.

In Obion Creek watershed, operations are being planned jointly by the Army Engineers and SCS. The SCS is responsible for planned land treatment and structural phases for the upland and tributary streams, while the Corps of Engineers is developing plans for channel improvement on the main stem of Obion proper.

This type of arrangement gives the maximum in protection and "closes the gap" between the conservation programs being carried out on the individual farms and the huge

task of controlling floodwaters of a large river.

The Obion community is noted for its public-spirited leadership. And because of the common threat to farming and incomes, there has been some kind of formal organization of mutual defense for 15 years.

When the small watershed help became available, local leaders lost no time in organizing for action. They took money left in the treasury of the old organization and held a kick-off dinner for the new conservancy district.

The conservancy district was formed in May 1956 with 14 board members—five from Hickman, the county most affected, and three each from Graves, Fulton, and Carlisle Counties. Meetings since then have averaged one each month, some for educational purposes and some to study new developments in the work plans. Tours have been sponsored to show watershed directors and district supervisors the effects of a watershed program.

Structural phases will take time. Meanwhile, district land treatment programs are going ahead. For example, 60 percent of the landowners in Graves County in the upper reaches of the watershed are conservation district cooperators. Waterways, terracing, treeplanting ponds, and pasture seeding are moving right along. L. W. Murdock, Graves district chairman, thinks the watershed program has helped put the accent on conservation farm planning and application.

Land treatment measures for flood prevention also consist of 1,103 acres of critical area stabilization, including 16 minor sedimentation structures, and 3.8 miles of roadside erosion control.

Structural measures planned are 14 floodwater retarding structures, including one multipurpose structure with a capacity of 5,480 acre-feet; 11 grade stabilization structures; 14 major sedimentation retarding structures; and 231,200 linear feet of stream channel improvement.

Plans are for a 5-year project costing $5,906,000 for installation with $3,975,000 of this to be borne by local interests.

SEDIMENTATION IN THE LOESS HILLS AND TERRACES OF THE LOWER MISSISSIPPI BASIN

No. 43

This is the forty-third of a series of articles to appear from time to time in explanation of the various phases or research being conducted by the Department of Agriculture on problems of soil and water conservation.

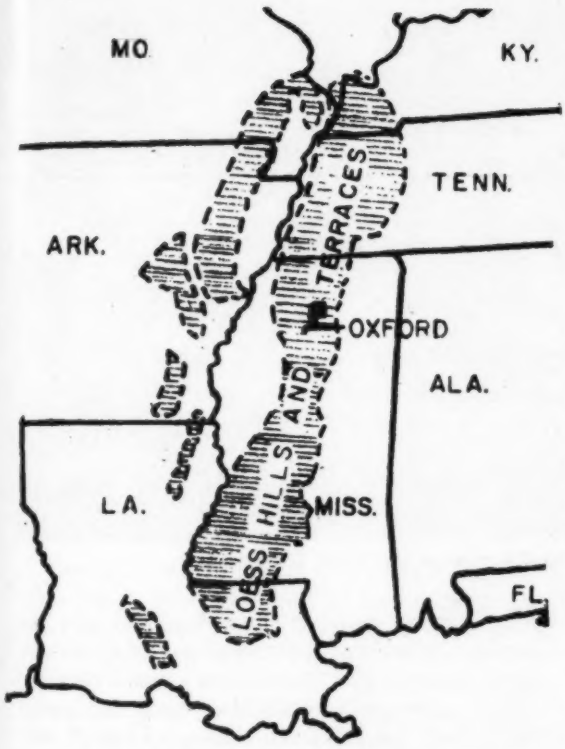
By RUSSELL WOODBURN

THE upland part of the Yazoo River drainage basin in Mississippi has suffered extensive erosion damage, particularly the loessial soils in the hills just east of the Delta. Locally known as the Brown Loam area it has a loessial cap varying in thickness, which is highly susceptible to erosion. In places the loess is thin and when cut through may expose unconsolidated sand formations. These sands have been the source of thousands of tons of sediment, which has filled stream channels and has been deposited on the bottom lands.

The widespread erosion and sediment problems are of concern to the Soil Conservation Service in carrying on an active program of flood prevention in the Yazoo River watershed. Of equal concern are local flood damages caused by channels whose efficiency has been impaired by sedimentation.

Generally, the same kinds of problems are found throughout the loess hills and lower lying terraces. This area extends for a distance

Note:—The author is supervisory hydaulic engineer, soil and water conservation research division, Agricultural Research Service, Oxford, Miss.



Loess hills and terraces problem area of the lower Mississippi River basin.

of about 500 miles from southern Louisiana, across Mississippi, Tennessee, and Kentucky to the southern tip of Illinois, with smaller areas west of the Mississippi River, in Missouri, Arkansas, and Louisiana.

Some studies of the erosion and sediment problems in the area were carried on by the former Division of Research of the Soil Conservation Service during 1936-37. This work was reactivated on a limited scale in October 1948 when a small project was set up at State College, Miss. Studies were made on gully erosion rates, channel stability, reservoir sedimentation, and sand transport.

There was gradual recognition that satisfactory progress in a study of these sediment problems could be made only by a comprehensive approach. Accordingly, in 1956 funds were provided the Agricultural Research Service for a large-scale sedimentation investigation pertaining to the Yazoo Basin and to similar areas throughout the loess hills and terraces of the lower Mississippi River basin. Following this authorization an expanded and intensified sedimentation research project was set up, with headquarters at the University of Mississippi, at Oxford, in the heart of the problem area.

Immediate objectives of the current research are to determine: (1) sediment production of watersheds of various sizes as related to land use and other watershed characteristics; (2) fundamental processes governing the transportation of sediment, particularly of sand by channel flow; and, (3) the amount and distribution of runoff from watersheds of various sizes and land uses.

Pigeon Roost Creek watershed in Marshall County, Miss. was selected for field study. Gaging stations and sediment sampling stations were established on representative channels and were in operation by January 1957. The drainage areas above these stations range in size from about one-third square mile to 117 square miles.

Records of streamflow and sediment discharge are maintained for each station. The U. S. Geological Survey cooperated with ARS by setting up and operating the stations until July 1, 1958. Since that date the stations have been manned by ARS personnel. Fifteen recording and fifteen standard precipitation gages are in operation at selected points in the 117 square miles of the project area in order to correlate rainfall and runoff.

A detailed land-use inventory is in progress on the 117 square mile watershed. An attempt

Runoff and sediment measurements are made with a Parshall flume, recorder, silt box, Iowa slot sampler, and end tanks below a 4-acre cultivated watershed.

Typical sand producing gullies in the bluff section of the Yazoo River basin.

will be made to calculate gross erosion for the watershed above each of the gaging stations. Consideration will be given to land-use and topographic variables in the watershed and to the estimated erosion potential of each acre. The calculated gross erosion will be compared with the observed sediment delivery for each station to determine a sediment delivery ratio. From such a ratio and a land use inventory, a fair estimate may be made of sediment delivery from ungaged watersheds in the problem area.

Runoff characteristics and sediment production of small units of single land use are observed on several watersheds. These watersheds range in size from 1 to 4 acres. Fractional-acre plots were established near the small watersheds for intensive studies of runoff and erosion from pasture and cultivated land.

Thus, runoff and sediment production data are being collected from watersheds ranging in size from less than 1 acre to 117 square miles with many intermediate watershed sizes. Special studies of small reservoirs, gullies, and channels started when the project was at State

Sand depositions on a bottomland field in Lafayette County, Miss., resulting mainly from overflow of sand-clogged stream channel.

College are being continued.

The Sedimentation Research Laboratory, under construction near Oxford, will be a permanent headquarters for the project. This facility will include offices for technical workers and a laboratory for analysis of sediment samples, which run to several thousand per year. Also included is a radiological laboratory where techniques will be developed for tracing sediment with radioactive isotopes. It is planned to develop a similar approach for sampling sediment in field silt boxes and for use in laboratory sediment studies.

A hydraulic laboratory is also planned for model experiments on the processes of sedimentation. A principal feature of the sedimentation laboratory will be a tipping recirculating flume, 100 feet long, for isolation and detailed study of special problems encountered in natural channels.

Preliminary findings of the project indicate that extensive studies may be necessary, in the laboratory as well as in the field, to solve problems of flat sand-bed channels. Apparently such channels do not always behave according to the hydraulic laws for channels with fixed boundaries. There appears to be a tendency toward high variability in the friction of sand beds. The rate of discharge is not necessarily fixed for a given gage height or depth of flow. Since friction may change, velocity may change; hence, the discharge may vary through a rather wide range with no corresponding change in stage.

A cableway used for measuring water flow and sediment content on a typical stream of the loess hills and terraces problem area of the lower Mississippi River basin.

Another peculiarity of the flat sand channels in the area is the formation of standing waves

A gaging and sampling station on a typical flat sand channel on Pigeon Roost Creek. Equipment includes a continuous automatic water-stage recorder and a depth integrating sediment sampler.

on the water surface for medium to high flows. Relatively high velocities are usually associated with this wave pattern. It is thought that the stream bed is also in a wave form with troughs and crests of waves in phase with the water surface. The bed sand waves are probably of a lower amplitude than the corresponding surface waves, but little is known of a specific nature on this point. Studies are underway to develop techniques for characterizing the sand bed configuration during standing wave flow as a part of the basic research on the mechanics of sediment transport.

This research program is being carried out by the Agricultural Research Service of the U. S. Dept. of Agriculture in cooperation with the University of Mississippi and Mississippi State University.

The First Twelve Years

A National Soil Conservation Awards Program, Started Because of What A Local District Did for One Farm, Wins Enthusiasm and Acclaim.

By CLYDE SCHETTER

BIG events often have their beginnings in minor incidents—to paraphrase the popular adage about oaks and acorns.

An outstanding example of industry-agriculture cooperation, carried out on a national scale today, is the direct result of an isolated personal experience that took place shortly after World War II.

Reference is to the national Soil Conservation Awards Program sponsored by the Goodyear Tire and Rubber Co., now in its sixth year as a national program and its 12th since inception at the regional level.

The personal experience was that of R. S. Wilson, Goodyear vice president in charge of sales, now retired, who purchased a 150-acre rundown farm in Charlevoix County, Mich., during the war.

To operate the farm, Mr. Wilson took into partnership a young 4-H trained couple, Ernie and Ada Brown. Both had experienced industrial work and city living but were eager to return to the farm.

In an endeavor to make the farm and its small dairy herd self supporting, Mr. Wilson sought the advice of Guy Springer of the Charlevoix County Soil Conservation District.

"Farmer Bob", as Mr. Wilson is known among his Michigan neighbors and friends, was greatly impressed by the revolution on his farm as a result of following the helpful suggestions of the district directors. He saw in his soil conservation district a model of democracy in action. He observed that the five district directors were public-spirited leaders of the community, active in many other fields, elected to their posts, and serving without remuneration other than the satisfaction of doing an important job well.

With the perception of a professional salesman, Mr. Wilson also noted that little public recognition was being given to soil conservation districts at that time. His inquiries revealed that in 1946 there were but three awards programs, in three States, each sponsored by conservation-minded newspapers.

Thus, the seed of a national conservation awards program was planted. It sprouted slowly at first. Impetus came from discussions among Mr. Wilson, members of his own company, and outstanding men in the conservation movement. Those who made important contributions during the preliminary period of the program's development included Soil Conservation Service men from the Milwaukee regional office, national and State soil conservation district officials, Extension Service representatives, and others.

The prime objective was to devise a practicable means of stimulating soil and water conservation in general; and, at the same time, give recognition to the efforts and accomplish-

Note:—The author is a public relations specialist, Goodyear Tire and Rubber Co., Akron, Ohio.

ments of specific individuals who were doing outstanding work in the field of conservation.

In order to consolidate the many ideas, suggestions, and discussions and develop a concrete proposal for a program Mr. Wilson appointed a committee within his company late in 1946.

Following careful study and evaluation, the committee recommended a number of fundamental principles that ultimately were adopted and have been the foundation of the program to date. These included:

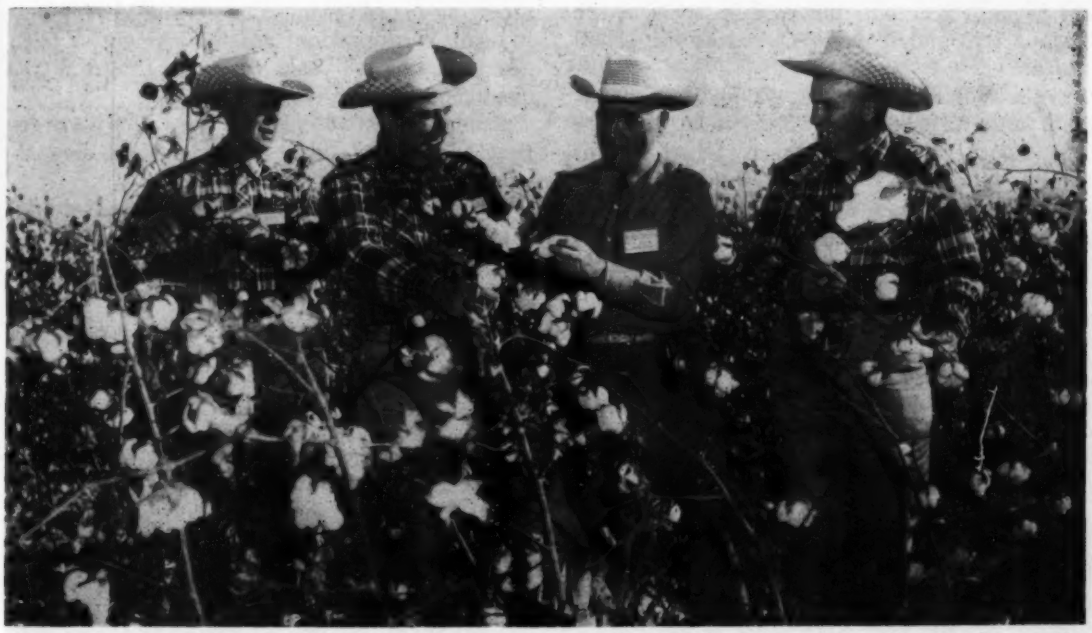
1. PURPOSE: To recognize outstanding accomplishment by soil conservation districts in carrying on their normal work and, by a system of competitive awards, to stimulate conservation workers to even greater efforts.

2. HOW and WHO: Awards on an annual basis to soil conservation districts for their work of organization, education, planning, publicity, and accomplishment; and, recognition of outstanding farmers and ranchers in each district for cooperation with the governing body in carrying out recommendations made for their individual farms and ranches.

3. CHOICE OF WINNERS: Winning district in each State to be chosen by a judging committee of well-recognized authorities on conservation (Goodyear to have no part in the selection of winners). Judges' decisions to be based on the work records of district governing bodies, rated according to a uniform point system scorecard. Scorecard to be in the hands of district governing bodies during the entire contest period so that at any given point they may know their score and thus work more diligently towards a higher score. The scorecard to be used by the district for submitting its record to the judging committee. When submitting the scorecard, the district governing body to designate the cooperating farmers who had done the most outstanding job of both cooperating with the governing body and of carrying out recommended conservation practices.

It was decided that immediate launching of the program on a national scale would be too large an undertaking. Instead, it was decided to first try out the program in one region.

Region 3 of the Soil Conservation Service was selected, for several reasons. One reason was that the eight States in the Upper Mississippi Valley Region included Ohio, where the home plants and offices of Goodyear are located. This made it more convenient to admin-



R. S. Wilson (second from right) brags about cotton grown at Litchfield Park to eastern cotton-growing guests (left to right) R. T. Ratliff, Miss., N. D. Buck, S. C., and Jack Dunn, Ala.

ister and observe the program during its early growth.

The first Goodyear Soil Conservation Awards program was launched August 1, 1947, and closed on July 1, 1948.

Grand awards included bronze plaques to the top winners in each of the eight States of Region 3 and a vacation trip to the sponsor's 14,000-acre agricultural subsidiary and guest hotel in Litchfield Park, Ariz., for all members of the first place district governing bodies and the three outstanding farmer-cooperators in the first-place districts.

The outstanding farmer-cooperator in every competing district received a framed certificate of meritorious achievement in conservation.

The original plan provided for presentation of grand award plaques at statewide luncheons, held by the sponsor, to which all contestants and members of recognized soil conservation groups within the State were invited.

Participation in the first program was so enthusiastic that it was repeated in 1948-49. However, as a further test, the grand award vacation trip to Arizona was replaced by cash awards (totaling $10,600) to ascertain relative merits of cash versus the Arizona trip as incentives for participation in the program. The test brought a resounding vote in favor of the Arizona trip and it was restored as the grand award.

In the fourth contest year (1950-51) the program was initiated in SCS Regions 4 and 5 (the Southern and Northern Great Plains States).

After 6 years of experience at the Regional level, a recommendation that the program be made national was approved.

For purposes of the national program the country was divided into 50 competing units to give weight to numerical distribution of soil conservation districts within certain States. Thirty-six units conform to individual State boundaries. Texas is divided geographically into three competing units; Kansas, Nebraska, Iowa, and Illinois into two each. New Jersey and Delaware are combined in one unit as are Vermont and New Hampshire. Rhode Island, Connecticut, and Massachusetts are one unit.

Statewide recognition luncheons were discontinued. A plan was substituted to have Goodyear representatives present grand award plaques at state-level annual meetings of the soil conservation district organization, and certificates of merit at local district meetings.

Grand awards were restricted to two from each competing unit, with the stipulation that one winner be the outstanding farmer-cooperator within the first-place district and that the other winner be a member of the district governing body, selected by that body for the award. A member of the governing body is not eligible for selection as outstanding farmer-cooperator.

Thus, the program currently provides annual grand awards for 100 individuals, of whom 50 are members of their respective governing bodies and 50 are the outstanding farmer-cooperators from the winning districts in each of the competing units.

During the 6 years that the program was conducted at the regional level, 12,523 guests attended 59 statewide recognition luncheons (in 17 States) at which grand awards were presented—an average of 212 per luncheon.

In the 11 years between 1948-58, a total of 837 soil conservation district supervisors and farmer-cooperators participated in the grand award vacation trips to Arizona.

District and individual grand award winners receiving bronze plaques as permanent symbols of soil conservation accomplishment totaled 582 in the first 6 years when the program was conducted regionally.

An additional 500 plaques have been awarded first and second place districts since the program became national (1953-54).

Framed certificates of meritorious achievement in soil conservation have been awarded to 10,215 farmer-cooperators and members of district governing bodies.

Many States have had 100 percent participation in the program (every organized district entering the program in a single contest year). A special plaque is awarded the State association for this accomplishment.

The current Goodyear Soil Conservation Awards program (1958-59) will conclude on April 30, 1959. The 100 winners again will be rewarded with an Arizona vacation trip.

Each year the acceptance of, and participation in, the program is evaluated. Renewal or extention of the program has, since the beginning, been on a year-to-year basis.

Game Refuge Gets A Conservation Plan

By DONALD J. MINEHART

THERE are few sights equal to that of a flock of geese, as they come out of the setting sun, gliding to a landing on a marsh. Each spring and fall as the flocks migrate from south to north and back to the south, Federal game refuges have served as a haven, a resting place, and a place to feed.

These refuges are located along principal flyways of the country. Refuge personnel are trying to get geese and ducks to use these areas as breeding grounds instead of merely using them as stopovers on the way through. Each year a few more pairs of birds stay on, as the managers of the refuges learn to employ more and newer tools for waterfowl management.

Sand Lake Migratory Waterfowl Refuge, located along the north edge of South Dakota, on the James River, is one refuge that has pioneered in new concepts of wildlife management.

The refuge lies on the eastern edge of the old Lake Dakota bed. The James River is the boundary of this old glacial lake; the east bank of the river is sandy, the west bank is silty. The river roughly divides 21,450 refuge acres. It flows across this part of the State through the sandy glacial lakebed. There is no valley for the river. At all times it flows but a few feet lower than at flood stage. When it does leave its bank, as it has a number of times, it floods the land for miles to the east. The "Jim" is a slow river here, dropping a foot or less per mile as it winds through the refuge.

In the thirties, when land and labor were relatively cheap, the Department of the Interior's Fish and Wildlife Service bought the land that now comprises the Sand Lake Migratory Waterfowl Refuge. Generally speaking, this refuge lies in an area containing land 3 feet higher than normal river flow, beginning just west of Helca and ending 16 miles south—3½ miles north of Columbia. The refuge varies between one-half and 3½ miles in width. A few of the farmhouses were retained as residences

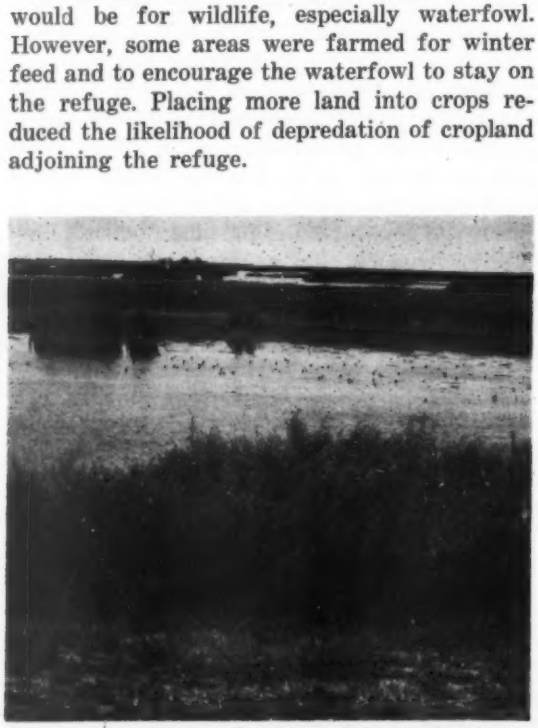
Note:—The author is work unit conservationist, Soil Conservation Service, Helca, S. Dak.

Aerial view of part of the Sand Lake Migratory Waterfowl Refuge.

for refuge personnel, but most of the buildings were sold or destroyed.

In the early days of the refuge, dams were constructed to increase and maintain impoundments at Sand Lake. Although many lakes or sloughs existed in the flood plain, their size was increased by these dams, also a more constant water level was maintained.

At the beginning of the refuge program, it was felt that the wilder the area, the better it would be for wildlife, especially waterfowl. However, some areas were farmed for winter feed and to encourage the waterfowl to stay on the refuge. Placing more land into crops reduced the likelihood of depredation of cropland adjoining the refuge.



Grassy vegetation in the foreground is alluring to ducks as nesting sites, while the phragmites and cattails in the middle distances attract few nesting ducks.

To bolster the argument for cropland acreage, observations proved there were considerably more ducks and pheasants on the farmed land than on adjacent wild areas. For a time, the cropland acreage figure climbed until it reached about 3,500 acres. About this time, Soil Conservation Service technicians, assisting the Brown-Marshall Soil Conservation District, were called in to help develop a conservation plan for the cropland areas. This plan represented the best thnking of the time, and has been changed only when new developments in agriculture so dictated. The trend in cropland acreage is now downward. At the present time, there are 3,252 acres being cropped. This figure is based on the land capability and probably will not change a great deal in the future.

Grazing was allowed on about a half dozen areas. Each of these areas represented land that apparently had little wildlife value. Other grassland areas were cut for hay in the belief that it would reduce predator damage.

Herbert Dill, former manager of the refuge, was a pioneer in the studies of grazing and wildlife. Dill's dragging operations (a long rope tied between two vehicles and dragged over the land) pointed to what many wildlife men already suspected. All the accessible areas were dragged including wild areas, hayland, and pasture. (Counts were made as the birds flushed in front of the rope.) The results showed no nests in hayed areas; few nests in the wild areas; and a larger number of nests in the grazed pastures. This was not conclusive proof, but it did bear out wildlife workers' theories that waterfowl liked not only cover for their nests, but also a unobstructed view of the surrounding terrain.

For a number of reasons, waterfowl instinctively use a path from water to nest that is open. But for 16 miles on both sides of the refuge on the banks of the river and marshes stood tall natural reed fences called phragmites. This wetland grass intermixed with cattails and some tall sedges, presented the big barrier to effective marsh edge clearance. Cattle didn't like this plant growth when it was mature and cleared it only where they trampled it on their way to water. The remainder of the time the livestock stayed on the upland sites, where they ate the bromegrass and the other cool-season grasses.

So the Soil Conservation Service was called to help revise the existing conservation plan for the refuge. The refuge manager at that time was Howard Huenecke. He needed no selling on soil conservation. He was an ardent believer in it, and fully realized the tie-in between wildlife and soil conservation.

Crop rotations were reviewed and the remainder of the farming land was set up for wind strip operations. More alfalfa was intro-

duced into the rotation and more rye was planted in strips to control wind erosion. The rye crop is readily eaten by ducks and geese, so lease arrangements to compensate the operator had to be made.

Most of the work done by the planning team was on grazing land. All hay production was discontinued except for alfalfa hay on cropland. Fences for new pastures were plotted by using the soils and capability map as a guide. Grasses were checked. Stocking rates were revised.

One thing noted was that nearly all the pastures were being handled as though they were native, warm-season grasses. Yet the opposite was true except for two pastures. The remaining 25 units were tame, cool-season grasses. Stocking rates were low. Actually, the refuge personnel preferred low stocking rates so grazing would be light. This achieved the patchiness they wanted in the upland grasses, but it left the lowland grasses and wetland vegetation undisturbed.

In addition to raising the number of animal units, it was decided to cross-fence most of the pastures. This was because most of the pastures contained two or three separate and distinct sites with livestock overgrazing better species on the better sites. Also, cross fencing

Donald J. Minehart examines a clump of grass on a grazed pasture that should make a suitable nesting site for waterfowl.

Permanent fences installed on the Sand Lake refuge permit rotation grazing and help increase the value of grassland for waterfowl nesting sites.

had proven effective where temporary electric fences had been tried. So they began placing permanent cross-fences between upland and lowland sites.

From early May to late June or July, livestock are confined to lowland and wetland sites with the main forage being prairie cordgrass, sedges, phragmites, and cattails. In with these are varying amounts of lowland vegetation such as wild barley, but the former species carry at least 90 percent of the load.

The secret is early grazing when the wetland grasses are succulent. Once the grasses are tall and woody, there is no way to get control through grazing. This means that grazing on these species must start by the first of May. In order to learn whether there was any benefit to waterfowl by early grazing, three areas were opened May 1st last spring. The remainder of the grazing units were opened on May 15. This was quite a change contrasted with former opening dates staggered from May 15 to July 1.

It is hoped that studies made this year will give more information on early grazing. It is certain that if livestock are not allowed in pastures until too late, the low and wetland vegetation is unpalatable from the start. The Fish and Wildlife Service indicates it will go all the way on the early grazing recommendations if the studies show conclusive proof that there will be control of marshland vegetation, and a corresponding increase in the use of the area for nesting by waterfowl.

Mapping Soils In Alaska

Volunteer Soil Scientists Spend a Summer Mapping Soils on the Kenai Peninsula of Southern Alaska.

By LESTER FOX

THE admission of Alaska to the Union has created new public interest in that land. But long before this new interest developed, soil scientists of the Soil Conservation Service, in cooperation with the Alaska Agricultural Experiment Station and other agencies, had been mapping the soils of Alaska. Now, with Alaska our 49th State, their work takes on additional importance. Their soil survey reports can be used in many ways not only by the people already in Alaska but by the many expected to go there now that the Territory has become a State.

Mapping Alaska soils is no picnic. It's hard work, often under trying conditions. The field work must be done during the short summer season. Different men are chosen each year from among volunteers.

Take the experiences of Soil Scientists George W. Allen of Vermont and Burrell Lovell of Oregon. Working as a team, they mapped 165,000 acres of Alaskan soil as their summer's mission in 1957. Lovell and Allen did their soil surveying on the Kenai Peninsula of south-central Alaska, in the Kanai-Kasilof and Ninilchick Soil Conservation Subdistricts. Each worked in the field during the day. In the evening they did their inking and compared notes on soils they had seen.

"There were big Brown bears around but they were hard to see," Allen related. "The danger was in surprising them, or getting too near their cubs without knowing it. Walking through the tall grass and thick alder patches of the river floodplains, sometimes right in bear and moose trails, was a little risky but it had to be done."

The men knew that other survey teams in Alaska had suddenly come face to face with the big bears on several occasions. As protection against such surprise encounters, the surveyors carried arms on their hikes through the unsettled country. Each was accompanied by an armed aid. The aids helped carry survey equipment and assisted in various other ways. The men never worked alone. That was because they were usually miles from the nearest road and, on the rough forest floor, always faced the possibility of a sprained ankle or worse.

In a large burned-over area the soil scientists found walking difficult and tiring. Down timber and snags made hiking rather difficult. Constant climbing and scrambling sapped their energy.

"When we came to streams too wide to jump or too deep to wade with boots, we had to strip

Note:—The author is an information specialist, Soil Conservation Service, Upper Darby, Pa.

Alaskan Brown bears are seldom dangerous except when one surprises them or gets too near their cubs.

and carry our clothes and equipment across on our heads," Allen recalled. "Sometimes we had to make two trips."

For part of the job the soil scientists had to travel along the sea beaches by jeep or weasel and then climb cliffs to reach the land to be surveyed. They had to watch their tide tables closely, as high tide covered all the beach in places.

In one area Lovell and Allen used four kinds of transportation. They started the day by driving 30 miles by pickup; the next 3 miles they did by jeep. Then they changed to the weasel for a 12-mile jog. After that they had to depend on their own legs and feet for the final 10 miles that covered their mapping area. They waded two streams, one with their clothes on, the other with clothes and gear on their heads.

Although most of the survey area is now unsettled, much of it is believed suitable for clearing and farming. Unfavorable economic conditions in the past have retarded settlement in their area. With the discovery of oil in the region, there's a good possibility that the market for farm products will improve.

One of the primary reasons for the soil survey in this area is to provide accurate information for the use of new settlers in selecting their land. Apart from the muskegs, most of the soils of the Kenai Peninsula are developed in silty material deposited by winds over gravelly glacial outwash or moraines. This silt mantle varies in thickness from a few inches to several feet. The underlying material may be highly permeable loose sand or gravel or may be quite compact and only slowly permeable.

Most upland soils are podzolized, strongly acid, and low in nutrients. After the land has been cleared, even the first crop planted must be liberally fertilized. With proper fertilization, however, the land gives good yields of adapted crops. The crops include small grains, grass, potatoes, and other root and leafy vegetables.

The area had been scouted before Lovell and Allen arrived in Alaska. They were given a preliminary mapping legend. Their principal job was to convert previous soil conservation surveys to a standard soil survey; but, areas not previously surveyed were covered also. After a brief period of familiarization with the soils of the area and a good look at the country from a light plane, the men were ready to strike out on their own. They were expected to recognize and describe soils that were not included in the preliminary legend, and later, to help write

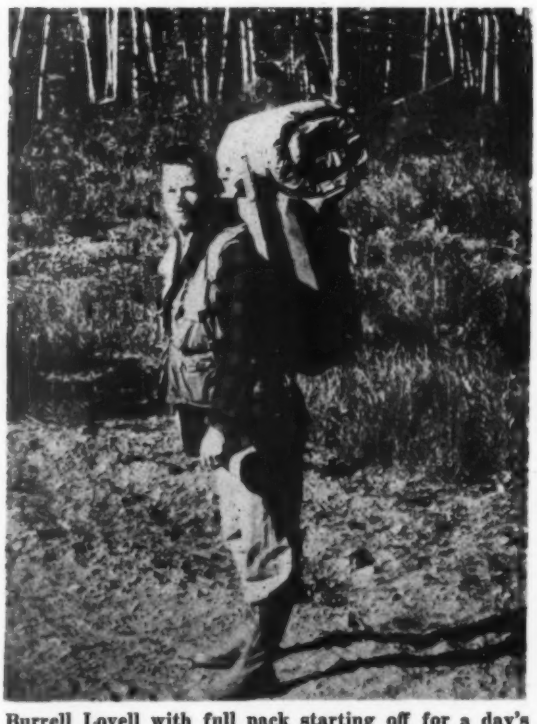
Truck with weasel ready to take off for a day's work at soil surveying on the Kenai Peninsula.

more detailed descriptions.

In a typical day, the men left the cabin at 7:30 for the day's work, each going his separate way with his aid. They usually remained in the field until 5 p. m. Often, though, they did not get through until 6 or 7. After dinner and the dishwashing chores, Lovell and Allen inked the boundaries drawn during the day's survey and stereoscoped slope breaks on the maps to be used the next day. Bedtime came fairly early, usually around 9:30 or 10.

"We did a large share of the mapping in heavily wooded areas," Allen said. "Nearly everywhere in the area was a carpet of moss several inches to a foot deep. We encountered large muskegs often. These we crossed on foot or by weasel." Most muskegs were largely treeless but some supported a dense stand of scrubby black spruce.

The character of the survey area and the location of roads, lakes, and muskegs determined the length of each day's traverse or route of travel. The men planned the route in advance so that each of the slope separations delineated



Burrell Lovell with full pack starting off for a day's soil surveying work on the Kenai Peninsula.

George Allen mapping soils in Alaska.

the night before with the stereoscope would be crossed at least once. Where possible, they walked along slashed section lines, with occasional detours to look at areas off the lines. They found walking easier along section lines, and it was not as hard to keep located. They noted section markers accurately on the maps whenever possible. These were important as control points to keep the maps accurate.

Sometimes a party had to stay out overnight in their pup tents. One week when they were out, it rained every day. Their bedding stayed wet all week.

When operating away from their base camp at Soldatna, they had to pack their tents, sleeping bags, mapping equipment, cameras, a week's food supply, and other necessities on portable pack boards.

"We couldn't get to one large area east of the Kenai River, between the Killey and Funny Rivers, from roads or by walking," Allen recalled, "so we hired a motor boat and canoe."

After boating several miles up the Kenai the party packed inland to a small lake. They had to rest several times as they were toting 60 to 70 pounds of gear through the Kenai burn-area of hills, muskegs, and down timber. They camped near a trapper's cabin and map-

ped the area on traverse lines between the Funny and Killey Rivers.

Soil surveying in Alaska is an arduous job. The men must be highly competent and experienced. Despite the difficulties of the work, the Soil Conservation Service has never lacked for well-qualified volunteers. The feeling of accomplishment that follows an assignment in Alaska has made it for many soil scientists a high point in their professional careers.

RICE AND FISH ROTATION

By A. J. TREXELL

H. H. Harvill, chairman of the board of supervisors for the Arkansas County Soil Conservation District rotates rice, cotton, soybeans, and fish crops on his farm near Humphrey, Ark.

He has constructed a levee around 400 acres of cropland, with cross-levees forming several reservoirs or fields of 40 to 60 acres each. These reservoirs provide water for fish production and for irrigation. They are completely enclosed and are filled by normal rainfall and by pumping from nearby drainage ditches and streams.

The rotation in these fields consists of 1 year in rice or row crops and 1 or 2 years covered with water to a minimum depth of 18 inches for fish production. Harvill states that during the years the land is in fish production the tilth of the soil is improved. With the aid of the minute plant and animal life in the water, a layer of residue is deposited on the bottom of the reservoirs.

He explains his production of fish this way: "I fertilize the water to produce microscopic plants to produce algae to grow more fish, and, at the same time, to increase the productivity of the land." A crop of fish, in Mr. Harvill's opinion, if properly managed may add as much organic matter to the soil in 1 year as a dryland farming operation might add in 40 years.

The fish—minnows, buffalo fish, or a special species of carp—do an amazing job of smoothing the bottom of the reservoirs. Immediately after a reservoir has been drained to harvest a fish crop, rice can be sown on the land by airplane, without seedbed preparation.

Note:—The author is area conservationist, Soil Conservation Service, Searcy, Ark.

H. H. Harvill near one of his fish reservoirs.

"Rice yields have been tripled in some instances through this fish production enterprise," Harvill states. He also pointed out that the alternative land uses following fish production are not restricted to rice. The increased soil fertility is helpful to any crop.

Harvill considers his reservoirs multipurpose. The purposes are: (1) provide storage for irrigation water for other land, (2) control weeds, (3) furnish waterfowl feeding and resting places, (4) contribute to the control of floods, and (5)serve as a recreational area for fishing and hunting.

Experience has shown that the operation re-

H. H. Harvill (left) and Kipp B. Sullivan, SCS technician, in a rice field that produced 100 bushels per acre following 2 years of fish culture.

quires careful management. However, Harvill and other pioneers in this type farming believe that the idea will eventually revolutionize farming on level, slowly permeable soils in Arkansas.

Soil Conservation Service personnel assigned to the Arkansas County SCD have assisted Harvill plan and apply precision land leveling on a large acreage. He believes that a water-cropland rotation combined with the production of food fish will facilitate his land leveling operations.

Pond For Pasture Irrigation

A 5-Acre Pond Provides Ample Water to Irrigate 20 Acres of Pasture and Furnish Recreational Facilities for Idaho Dairy Farmers.

By VIRGIL S. BECK

CONSTRUCTION of a pond to catch run-off water from their 200-acre farm, near Troy, Idaho, has enabled Willis and Orland Arneberg to convert a low-producing dryland farm into a highly profitable dairying operation.

Water caught in the Arneberg brothers' pond is pumped back onto the land through a sprinkler system to irrigate pastures that support a herd of 55 Holstein cows 140 days a year. This is one of the accomplishments that resulted in the Arneberg brothers being named "Grassmen of the Year" in Latah County in 1958.

"This is the first development of this type in the Latah Soil Conservation District and probably in the entire Inland Empire," stated James M. Rabdau, area conservationist for the Soil Conservation Service. He also points out that around 300 ponds have been constructed in the district, and that there are numerous locations where similar developments could be made.

The brothers have been renting the farm from their father, Harry Arneberg, and operating as partners since 1949, a few years after they returned from service during World War II. Willis, now 36, was a pilot in the Air Force, and Orland, now 31, served with the Infantry, both in the Pacific Theatre. The father, who calls himself retired, still is one of the busiest people on the farm.

Note:—The author is information specialist, Soil Conservation Service, Berkeley, Calif.

The farm dates back to Martin Arneberg, grandfather of Willis and Orland, who migrated from Norway to northwestern Idaho in 1885, and homesteaded 120 acres on Little Bear Ridge, southeast of Troy. He bought an adjoining 80 acres in 1901 to make up the 200-acre farm. His son, Harry, was born on the farm in 1893. Harry worked with the pioneer Arneberg growing wheat and beans, and farming with horses for many years before the advent of mechanized farm equipment.

Harry Arneberg took over management of the farm from his father around the end of World War I. He continued dryland farming of wheat, peas, barley, oats, and other crops common to the area and kept a few work horses and milk cows. He became a cooperator of the Latah Soil Conservation District in 1944, and started using crop rotations that included legumes and grasses.

Soon after Willis and Orland took over the farm, they decided to get into dairy farming. They started with around 25 grade Holstein cows and a purebred herd bull. However, having no native pasture they had to buy hay and keep their herd in the feedlot all the time.

In 1951, the brothers constructed a six-cow milking parlor and milk room according to Grade A standards. They started increasing their dairy herd, getting better producers and culling the poor ones.

The brothers soon realized however, that one of their main problems, if they were to operate

profitably, was to produce their own grass so they could reduce the expense of purchasing hay.

The Arnebergs discussed their problem in 1952 with Soil Conservation Service technicians working with the Latah district. The conservationists found that a lot of water was running off the farm. They suggested that a dam could be built across a draw on the farm to create a storage reservoir to provide irrigation for a lot of grass. The sons discussed the proposal with their father and decided to undertake the project.

SCS engineers designed the dam, which had to be approved by the State Reclamation Department. Construction was supervised by SCS technicians.

Using a bulldozer and carryall belonging to the Latah district, the Arnebergs built an earth dam 400 feet long and 24 feet high across the draw. The dam was built mainly with subsoil material, and excess soil from the excavation was placed in nearby draws to eliminate shallow areas around the edge of the pond. Thus a 5-acre pond was created that is 22 feet deep at the deepest point.

Development of the pond for sprinkler irrigation cost $6,650, of which $1,200 was reimbursed through the ACP cost-sharing program. The cost of earth moving was $3,000, installation of the irrigation system cost another $2,900, and erection of 1,900 feet of powerline to the pump cost $750.

The Arnebergs (left to right) Willis, Harry, and Orland. Willis is standing in Latar grass, while Harry and Orland are in common orchardgrass. Both plots are irrigated from the Arneberg pond.

The irrigation main line is 1,900 feet of 4-inch aluminum pipe. Laterals are 650 feet of 3-inch pipe with sprinklers. It takes one man about 20 minutes to move a lateral. A 10-horsepower, three-phase motor and a centrifugal pump are part of the irrigation system.

Aerial view of the Arneberg dairy farm showing the 5-acre irrigation pond in right middle-distance.

The Arnebergs seeded 14 acres to a mixture of 4 pounds of orchardgrass and a half-pound of ladino clover per acre. Finding later that the pond would provide enough water to irrigate more acreage, they seeded an additional 6 acres to Latar and common orchardgrass with ladino clover and alfalfa. The Latar orchardgrass seed for the trial planting was obtained from the SCS Plant Materials Center at Pullman, Wash. through cooperation of the Latah district.

The Arnebergs start irrigating around June 15, and irrigate five or six times a year, putting on 2½ inches of water in 11½ hours per set. In 1957, they used about 8 million gallons of water, or 1.7 acre-feet per acre. Yet, the pond was still about half full at the close of the irrigating season. They apply 600 pounds of ammonium sulphate fertilizer a year to these pastures in three applications.

The 20 acres of irrigated grasses are divided by permanent fences into 8 pastures of about 2½ acres each, so grazing can be rotated as necessary.

The Arnebergs now have 55 grade Holstein cows, which they believe to be about the right number for their feed production and facilities. They have kept milk production records since 1955. They have found that when the herd is in the feedlot on dry hay they produce 10 to 15 percent less than when they are on irrigated pasture.

The cows are on the 20 acres of irrigated pasture 4½ months, or 140 days, so a ton of hay is saved daily, or 140 tons a year. Therefore, the irrigated pastures replace 7 tons of hay per acre. The records show that when the cows are taken off the irrigated pasture during rains to prevent trampling, value of milk production drops $8 a day.

The Arneberg herd of 55 cows produced 363,000 pounds of milk in 1957, and they estimate that the 1958 production will be 450,000 pounds from the same number of cows. This gain of around 87,000 pounds is attributed largely to better breeding and culling.

The Arnebergs now consider their Grade A dairy herd and forage production in excellent balance. Last year, they installed a 1,000-gallon refrigerated milk tank, and a 3-unit pipeline milker at a cost of $7,000. They have 6 milking stalls, so 3 cows are milked while another 3 are being readied. The milk goes direct from the milker into the refrigerated tank, and then is pumped into the milk truck for transporting to market.

This year, the Arneberg 200-acre farm included the 5-acre irrigation pond, 20 acres in irrigated pasture, 37 acres in wheat, around 100 acres in grasses and legumes for hay, a 3-acre calf lot, and 15 acres in timber and the farmstead. In addition, they rented 80 acres across the road, which had 30 acres in clover

Sprinkler irrigation system on the Arneberg farm.

and alfalfa for hay, 17 acres in fall wheat, and 28 acres in barley.

They plan to rotate wheat and barley on dry hay acreage, and eventually will change some dryland to irrigated pasture. If necessary some irrigated pastures will be plowed out to renew the stand. They also plow out enough clover and grass each year to take care of their wheat allotment.

The Arnebergs have found that crop rotations are increasing wheat and barley yields, the wheat now averaging 35 to 40 bushels to the acre.

They have two upright concrete-block silos, 16 feet in diameter and 35 feet high, in which silage of clover, alfalfa, and grass is stored. In addition, they have a shed for storing hay. In 1957, they used 57 tons of their own hay, and bought an additional 125 tons. In order to provide more storage for silage, they plan on raising the height of the 2 silos to 50 feet. This will increase the storage capacity from 425 to 625 tons.

In addition to making possible the 20 acres of irrigated pastures, which are the lifeblood of the Arneberg's dairying operation, the pond also provides recreation for their families and neighbors. The pond and pastures also provide food and a rest area for migrating ducks and geese, and numerous deer have been observed coming for water. They also plan on stocking the pond with fish.

Steward Of The Land

By HERB BODDY

SINCE the Washington Soil Conservation District of Oregon was voted in back in 1955 and Max Reeher was installed as the district's first board chairman, an evening prayer has softened the hard.core of all business meetings of the supervisors.

Max, a deacon in the Forest Grove Congregational Church, says, "We're not aiming to sell religion to our board or get 'preachy' about things. We just feel that it's right to ask the Lord's blessing before tackling our tough soil and water problems."

Note:—The author is information specialist, Soil Conservation Service, Berkeley, Calif.

Max Reeher.

Early in May we found Max in the parlor of his vine-covered hilltop cottage talking shop with SCS Technician, John K. Anderson. From a picture window we looked down on fertile Tualatin Valley farms. And on the crest of the distant Cascade and Coast Ranges stood those mighty mountain sentinels—Ranier, Adams, St. Helens, Hood, and Jefferson. Max and his wife Mildred wouldn't trade their eye-opening view for a Swiss chalet.

Max Reeher put in 37 years as an entomologist with the old Bureau of Entomology and Plant Quarantine (now under ARS) in Forest Grove before settling down to the quiet of his cottage.

Max's friends weren't surprised when they heard he was out helping organize the 450,000-acre Washington SCD. He had always been a hustler!

Today the district's soil conservation problems shape up as one of his biggest volunteer interests. Nut and fruit growers have already voted in one addition to the district and a referendum recently held included the rest of the county under the district banner.

Max isn't a big-time operator. He owns one of the many pint-sized farms in northwest Oregon. His small pasture is well-kept and his white face cattle look good and fat.

His chief business is a half-acre of hybrid tree peonies—"largest planting west of the Mississippi." Hybrids from this rare variety are grown from seed and take around 5 years to bloom. Flower raising has grown from a pleasant, free-time hobby to profits which now amply cover growing and marketing costs, plus a little extra.

Each year around May Day, Max and Mrs. Reeher are host to daily crowds of 200 or more visitors who come from miles around to see the colorful blooms.

With cattle and peonies to care for, most folks would let things go at that. But for a number of years Max has been a woodland grower too.

As president of Reehers, Inc., a family enterprise, and cooperator with the North Tillamook SCD, he has the long-range job of replanting about 274 acres in the old Tillamook Burn near his birthplace on the Wilson River.

The woodland project is being managed as a certified tree farm and Max and the Reehers hope to reap a good profit from timber before many years. Max has personally planted a good share of the 75,000 fir and spruce seedlings that have gone in since the reforestation work began in 1947.

With all his other interests, Max has found time to serve three terms as chairman of the Washington Chapter of the Izaak Walton League, teach a Sunday school class, sing in the choir, and go to meetings of the Portland Men's Garden Club.

But, above all, Max Reeher likes to think of himself as a good steward of the land.

NEW KIND OF FLOOD DAMAGE:—About the time the French Creek Watershed work plan was completed in the State of Washington in November 1958, a 50 year frequency rain storm hit the watershed. The heavy fall rains saturated upland soil profiles and also melted early snow on the Cascade Range with resultant heavy flooding of valley bottoms.

Peat islands floating on floodwaters of French Creek.

During the course of checking damages and high water marks, islands were noticed by SCS technicians where high ground did not exist. The mystery was solved when the islands moved with the current. They proved to be large bodies of floating peat which had broken loose as a result of dry summer soil conditions and had popped to the surface when the land became flooded. Many acres were therefore left with deep, extensive excavations, and other areas were covered with peat hummocks as the water receded.

—F. A. Mark

FEDERAL LANDS TO ALASKA.—Under terms of the statehood act, the new State of Alaska is granted the right to select 400,000 acres of vacant lands in National Forests and an additional 400,000 acres of other Federal lands adjacent to established communities. Also, the State is authorized to select more than 100 million acres of Federal land located elsewhere in the State.